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Form 3547 - Requested

We grow and sell only the very best material, heavily branched and well shaped. The practice of pinching the tips to shape Rhododendrons, used by most nurseries, was abandoned by us many years ago after noting how decidedly superior our plants were that had been cutback. Using this cutting-back procedure, it requires more time for a plant to reach a given height, but we determined to continue this practice in keeping with our policy of growing and selling only top grade material. Our cuttings are made from quality stock, true to name. All our plants are given optimum growing conditions and the individual attention prerequisite to the development of distinctive material. We list our plants by size but these sizes are only approximate. In many, many instances plants sold are larger than listed, and occasionally, slightly smaller. Our goal is not height but first grade stock, — and we sell nothing else.

Wherever successfully grown, no other garden shrub equals the majestic beauty and excellence of the Rhododendron. Pleasing to the eye at all seasons, some evergreen attains new heights with the arrival of spring, as flowers rest like jewels on leaves of burnished green.

natural distribution of Rhododendrons is unique, extending to all ients of the northern hemisphere, and reacing below the equator into Borneo, New Guinea, Java, and northern Australia. In all, the genus embraces over 900 species, ranging from the tiniest alpines a few inches high with minute leaves shorter than a child's fingernail and no broader than a match, to large trees towering to heights of sixty feet or more, having leaves nearly three feet in length.

The flowers too, vary in size, shape, color and character as do the species. From miniature trusses with veil-like florets less than a dime in diameter, they graduate to massive clusters larger far than a man's head, with velvety-thick, trumpet-shaped florets in excess of six inches wide.

TOP ROW, LEFT TO RIGHT — "CONEWAGO,' 'PIONEER,' 'WINDBEAM'
BOTTOM ROW, LEFT TO RIGHT — 'DEXTER #9,' 'GIBRALTER,' 'CADIS'

Despite their accuracy, color reproductions only lend assistance in visualizing the actual plant in bloom. For it is impossible to delineate the many minute features of a flower comprising its elegance. A color picture regardless of its precision, limited to two dimensions, cannot bring to life to the viewer the full feeling experienced in personally observing a plant in bloom. Flower color is inconstant. From the time color first shows in the opening bud until fully expanded, through the peak of bloom and its fading, there is constant change. Flower color may be considered an optical illusion governed by: the lighting at various times of the day; the angle light strikes a truss (whether back-lighting, side-lighting, or the direct glare of the sun); refraction and other influences. A picture captures this for but an instant. In addition there are flower texture, substance, truss modelling and other qualities which escape a photograph.

There is an expected loss of about 20% in accuracy in offset color printing. We have been very fortunate for the results here are excellent. In the picture 'Windbeam' and 'Conewago' show slight traces of blue not present in the actual plant, and 'Pioneer' is not quite as pink as shown. 'Cadis' and 'Gibralter' are exact reproductions, and 'Dexter #9' only lacks a faint trace of apricot to be exact.

In the United States we have 25 species, including the deciduous Azaleas, which actually are Rhododendrons, too. But by far the greatest concentration is in Western China (Yunnan and Szechuan provinces) and Tibet, where the wild species cover the countryside for almost endless miles. All of the basic colors of the spectrum are seen here with their many tints and shades. Starting in the Rhododendron forests at the 8,000 to 9,000-foot level, we find the larger Rhododendron trees the dominant growth. At elevations of 10,500 to 11,500 feet Rhododendrons and Bamboo flourish side by side. Still farther up, thickets of Rhododendrons 5 to 6 feet high form impenetrable tangles over vast acreage. Beyond this on the alpine meadows and to the very top of their range at nearly 18,000 feet, Rhododendrons become the prevelant vegetation growing in unlimited league of breathtaking beauty; — seas of bloom covering hundreds of acres, fetching vistas and panoramas of color unparalleled in the plant kingdom. No other genus boasts such diversity and botanical wealth.

With this treasure—trove of plant life from which to select, it is little wonder that hybridists have, over the years, developed the stunning races which have won Rhododendrons a place of prominence in American gardens.

Our catalogue is devoted exclusively to the choicest of these hybrids, both old and new. The list of plants offered will always be comparatively restricted, selecting only the few superior from the ordinary, eliminating the confusion of long lists of perplexing names, and avoiding duplicity.

Years of accomplishment have fittingly earned for Joseph Gable the title "dean" of the Rhododendron breeders of this country. His creations are diverse and numerous,—acclaimed both here and abroad. I have been closely identified with him for more than ten years, collaborating in the propagation and dissemination of his hybrid creations. The catalogue will have as its nucleus these modern superior hybrids of Joseph Gable, and as they become available in sufficient quantity, will be offered for sale.

But there will be plants of other prominent American hybridists also. Amateis, Dexter, Leach, Nearing, Pride, and Shammarello. These men too are dedicated to perfection and devoted to a purpose: to infuse the exotic charm and beauty of the species from the Orient with the hardiness required to withstand conditions in the northeastern United States. These men, who have been at this work for 20 to 40 years, have accomplished a great deal and many fine new hybrids have been produced. At this time, we are able to offer novelties from both Nearing and Dexter, and have under propagation many others to be soon released.

CAROLINE—One of the first selections of Gable's hybridizing, 'Caroline,' although widely known, is little seen. Difficult to graft and at first practically impossible to root from cuttings, this attractive hybrid has not enjoyed its share of use in our landscape. Today it is being successfully grown from cuttings and may soon be available in moderate quantity. It is a hybrid which will find its greatest appeal to those who enjoy the more subtle hues. The large, thick-textured, sweetly scented, pale mauve flowers persist unusually long. This hybrid has withstood, temperatures of more than 20° below zero without damage to either plant or floral buds. Being extremely hardy, it represents, as far as I know, the first opportunity to include fragrance in Rhododendron gardens where temperatures may plunge well below zero. As a foliage plant, it makes a handsome shrub with waxed leaves of unusual length and branches hugging the ground. Hardy zone 4.

15" - 18"	$15.00
2 Ft.	$18.00
24" - 30"	$20.00

See color photo

WE MAKE EVERY EFFORT TO REPLY TO ALL OUR CORRESPONDENCE, BUT IT BECOMES AN IMPOSSIBILITY DURING THE RUSH OF THE SHIPPING AND TRANSPLANTING SEASON. THOSE LETTERS AND CARDS RECEIVED DURING THIS PERIOD THAT DO NOT REQUIRE IMMEDIATE ATTENTION WILL BE ANSWERED LATER IN THE YEAR.

CADIS—It is impossible to accurately describe the elegance of this hybrid in flower. It excels in flower texture, substance, truss modelling, the balance between truss and plant, and a host of other characteristics—trifles in themselves, but collectively making a hybrid which is nothing short of exquisite.

Gable's 'Cadis' is one of those hybrids to which the finest color reproduction does only partial justice. It is refreshingly fragrant, light, appealing pink, satiny in texture. There are 10-12 round florets per truss, each flower averaging 4 inches in diameter and 2½ inches in depth. On well-established older plants, individual florets reach 5 inches and more in diameter. The truss is full and flat-topped. The bush habit is excellent, developing at maturity a shrub only slightly taller than wide. The lance-shaped leaves are bright green, firm and average 6 inches in length.

TOP ROW, LEFT TO RIGHT — **'SCARLET PIMPERNEL'**, 'CAROLINE', 'PINK TWINS'

BOTTOM ROW, LEFT TO RIGHT — 'REDHEAD', 'LOUISE', 'DAVID GABLE'

Cadis' is a cross between 'Caroline' and *discolor*. It was named by Gable about 1949. At that time he considered it one of his very best hybrids and so it remains today. Propagation has been slow and, despite the fact that we have been propagating it for almost 10 years and have never sold any plants to this time, supply is still very limited. Gable has sold in the last few years only a few. It therefore is not possible to do more than project its hardiness and make recommendations accordingly.

We know it is hardy at Gable's at Stewartstown, Pa., and at Rochelle Park, N. J., it has perform.ed satisfactorily for 5 years in the test garden. From past experience in these matters, I can interpret from this that it will be hardy in all areas comparable in climate to that at Rochelle Park and southward. Also, it should be hardy west of the Cascades in Washington, Oregon and Vancouver, B. C., on Long Island and in sheltered gardens in Connecticut and Massachusetts, and along the tempered shores of the Great Lakes. I would not recommend it for upper New York State, the mountains of northwestern Pennsylvania, New Hampshire, Vermont and for similar areas.

At Rochelle Park an average winter includes, in addition to long periods of freezing and near zero weather, occasions when the mercury plummets to 5° or 10° below zero and lower in more severe winters. The winter of 1958-59 was a little more punishing than average with frost constantly in the ground from mid-December until early April, reaching depths of 3 to 4 feet. After this winter, 'Cadis' bloomed well for me losing only an occasional flower in a truss. But despite these and other encouraging signs, I can recommend with only reasonable assurance, for there are many micro-climatic factors singular to each area influencing the ability of a plant to adapt to a new location.

Hardy zone 6. Blooms late May.

9" - 12"	$ 9.50
12" - 15"	$12.50
15" - 18"	$16.50
Approximately 2 ft. specimen plants individually shipped	$25.00

See color photo

DISCA — Named in 1938, it is a selection from a cross between *discolor* and 'Caroline' (the reciprocal cross from which 'Cadis' was selected). 'Caroline' is a *decorum* hybrid and *discolor* a specie from Szechuan and Hupeh provinces of China.

'Disca's' flowers are pure white of immense size. The truss is as handsome as I have seen anywhere. The individual florets, slightly ruffled along the edges, are neatly arranged and fitted into a truss molded to perfection.

In Rochelle Park, 'Disca' blooms about the middle of June. At this time of year of longer days and more intense sunlight, the flowers of 'Disca' will become damaged if exposed to these direct rays. 'Disca' therefore must be set in semi-shade, preferably in a situation that will afford mid-day protection.

Although plant hardy at Rochelle Park and farther north, it blooms here only after milder winters. It is hardy with Gable and can be recommended without reservation for areas comparable to Gable's at Stewartstown. In the east this would include the Philadelphia-Trenton area, and south through Delaware, Maryland, the Virginias and North Carolina. It would also include Long Island. In the west — Oregon, Washington and Vancouver. Also, along the south shore of Lake Erie near the Mentor, Ohio, area.

Hardy zone 7.

12" - 15"	$12.50
15" - 18"	$16.50
Approximately 2 ft. specimen plants individually shipped	$25.00

ALBERT CLOSE — This hybrid is actually not a Gable creation. The cross *maximum* X *macrophyllum* was made by George Fraser of the West Coast, and the seeds shared with Joe Gable. Gable selected one outstanding plant, which was admired by Dr. Close and named in 1951 in his honor.

It is a large growing hybrid, with unusually attractive blue-green foliage. The flowers are average size (1½-2" in diameter), 15-20 per truss forming a compact, bright rose-pink tall head with a heavily spotted throat of chocolate-red. It blooms early June. Hardy zone 6.

9" - 12"	$ 8.50
12" - 15"	$12.50
15" - 18"	$16.50
Approximately 2 ft. specimen stock plants individually shipped	$25.00

PINK #2 — This fine hybrid, like 'Cadis,' is a cross between 'Caroline' and *dicolor*. So similar is it to 'Cadis' that a description is unnecessary. It blooms a week later than 'Cadis' with flowers of equal size, but of a lighter pink.

I judge it to be slightly hardier than 'Cadis,' though it has not been tested that extensively that this evaluation is conclusive.

Blooms early June. Hardy zone 6.

9" - 12"	$ 8.50
12" - 15"	$12.50
15" - 18"	$16.50

'Pink #2' is now 'Robert Allison'

CATALODE — A Gable hybrid from a cross between 'Catawbiense Album' and (Loderi g.) 'King George' (*griffithianum* X *fortunei*) it is a pure, clean, large-flowered crisp white. The leaves are large (in themselves an attraction) measuring up to a foot in length on older plants. Although 'Catalode' will not reach the proportions of *maximum, fortunei,* and *discolor,* it does require room and enjoys the curtain of shade the deep woodland affords. It is hardy with Gable at Stewartstown. I have not had sufficient experience with it at Rochelle Park to pass comment on its hardiness. But Orlando Pride of Butler, Pa., where temperatures of 25° below ZERO occur rather regularly, writes: "Rhododendron 'Catalode' is very plant-hardy with me. This year (1960) it bloomed fairly well with some bud blast but it is in a very bad hollow at the nursery where nearly everything gets its buds blasted. I think that 'Catalode' will be hardy most anywhere in the city of Butler with a little protection."

For the first few years of blooming, vigorous Rhododendrons such as 'Catalode' partially conceal their floral beauty by new growth which emerges simultaneously with the flowers. As the plant matures, flowers buds are produced in greater abundance, and with it a gradual diminution of plant vigor ensues. After this physiological alteration, spring growth is delayed until blooming has all but finished. In Rochelle Park 'Catalode' blooms early May.

Hardy zone 5.

9" - 12"	$ 8.50
12" - 15"	$12.50
15" - 18"	$16.50
18" - 21"	$18.50

'Catalode' is now 'County of York'

ONE PLANT EACH IN THE 12" - 15" SIZE OF THE ABOVE NEW HYBRIDS $54.50

DAVID GABLE (Pink # 1) The cross from which this hybrid came ('Atrosanguineum' X *fortunei*) was made by Joseph Gable in 1940. The first plants flowered in 1948. Two years later there bloomed in that lot a plant of outstanding promise which Gable tentatively labeled 'Number ONE pink". This was later changed to "Pink # 1". It turned out to be the only worthwhile plant derived from that cross but thought by many to be his crowning achievement to date. Only it is now available for sale and the quantity is small.

To tag a flower as a "pink" creates an ambiguous impression, for the tints and shades of pink are myriad and each visualizes the pink most appealing to his own taste. But 'David Gable' is one of those pink admired by everyone. I think of it as the prototype pink. It has no trace of magenta or purple. The florets are large, reaching over 4 inches in diameter. The truss is full, tight, and sturdy, and rests well on the rosette of handsome leaves underneath. The upper lobes have no blotch but a bright strawberry throat. The outer rim of the individual floret is a shade darker than the flower, defining each floret in the truss. On the Horticultural Color Chart 'David Gable' registers Phlox Pink, 625/ 2-1.

As a shrub 'David Gable' leaves little to be desired. The foliage is bright polished green. The bush shapes readily forming a half dome slightly broader than high, and it flowers in early May long before the midseason hybrids so that it is an outstanding contribution toward extending the blooming season for first quality garden Rhododendrons.

Hardy zone 6 See color photo

1 plant per customer.

9" - 12" $10.00

PINK TWINS (Cathaem # 4) This hybrid is both unique and distinguished for its quality. In addition to its garden value, it is of special concern to the hybridizer for it is a primary cross between *catawbiense* and *haematodes* bearing unusual hose-in-hose flowers, the first hardy Rhododendron to be introduced with this attractive feature. The color is very light shrimp pink. The flowers are fleshy, of great substance and durability, but possessing a lace-like delicacy. There are 15 or more florets per truss, each 2 inches or slightly more in diameter, making neat pink balls of bloom. The shrub, though not a dwarf, is slow growing and compact, broader than high. The leaves are ovate (having the shape of the longitudinal section of an egg, the broad end being basal) only 3 inches in length and balanced nicely with the size and habit of the shrub and flowers.

The flowers of 'Pink Twins' are open campanulate, appearing as a bell within a bell. The color is uniform without blotch or darker throat. It blooms the end of May. Hardiness zone 6. See color photo

One plant per customer.

9" - 12" $9.50
12" - 15" $13.00
15" - 18" $18.50

ROCHELLE—A flash flood which swept Guy Nearing's nursery in Ridgewood New Jersey in 1945 washed away thousands of experimental plants, destroying the promise and hope of 15 years' work and more than 25 years intensive study and research. Potential important contributions to horticulture were lost forever. After the waters receded one consolation amid the destruction was that his new 'Dorothea' hybrid race was unscathed.

'Rochelle' is the first of these to be offered for sale, to be followed later by others. 'Dorothea' is *decorum X griffithianum,* both members of the Fortunei series. *Decorum* is similar to the well known *fortunei. Griffithianum* is noted for its exquisite, large flowers, up to 6 inches across, reputed to be the largest of all the Himalayan Rhododendrons. It is a parent of two renowned English hybrids; 'Loderi King George', and 'Pink Pearl', both tender in the East.

In 1935 Mr. Nearing crossed 'Dorothea' with the hardy red "ironclads", 'Charles Dickens', 'Kettledrum', and 'Charles Bagley'. He believes "Rochelle' to be the result of the mating with 'Kettledrum'.

'Rochelle' is slightly lighter in its pink flower color than 'David Gable' but with a similar strawberry throat. The fragrant flowers are 3½ to 4 inches across, 7 lobed, round, forming a perfect truss. There is a velvety texture and softness to the flowers combined with an air of distinction from their crisp cleanly molded outline. It well deserves the kudos it has received. It blooms late May. Hardy zone 6. One plant per customer.

9" - 12"	$10.00
12" - 15"	$14.00

SMIRNOWII X FORTUNEI — This Gable novelty is offered primarily as a subject of further breeding. It makes a compact well-branched shrub with sea-green, lance-shaped foliage. Its growth character resembles *smirnowii* with a bit of the *fortunei* vigor. Although the undersides of the leaves are light or silvery they do not possess the woolly tomentum of *smirnowii.* (Perhaps in the next generation).

Individual florets measure 3½ inches across and have a light yellow throat. The trusses are light mauve pink, full and rounded. The wings and falls of the florets reflex slightly. It blooms early May and is fragrant. Hardy zone 6.

12" - 15"	$9.00
15" - 18"	$12.50

OUR STOCK OF 'REDHEAD' AND 'KEISKEI' IS LIMITED THIS SEASON. IF OUR SUPPLY BECOMES EXHAUSTED, ORDERS FOR THESE PLANTS WILL BE REFUNDED UNLESS SUBSTITUTIONS ARE SPECIFIED.

REDHEAD (Atrier #10) The cross from which this fine plant came was 'Atrosanguineum' X *griersonianum*, made in 1940 by Joe Gable. It was not until 1949 that several dozen seedlings bloomed, some very beautifully. They were numbered and watched for further development. Most, as Gable predicted, were not sufficiently hardy, and in the years following, succumbed to cold. Two from the more than 100 original seedling warranted naming and introducing. Redhead is one of them.

The bush is open and spreading. The foilage resembles *griersonianum* more than 'Atrosanguineum.' The huge round truss is made up of about 15 florets that are bright crimson, each measuring over 3 inches in diameter. They are open coneshaped, of remarkably heavy texture. Blooms late May. This is not just another red hybrid. The color is distinctive for a hardy Rhododendron. It is the first *griersonianum* hybrid to be introduced in the East and the orange-red of this species is evident in its offspring in contrast to the blue-reds which have dominated the nursery lists for over a century. Hardy zone 6. See color photo. 1 plant per customer.

12" - 15"	$13.00
15" - 18"	$18.50

MAXHAEM SALMON - This primary hybrid of Joseph Gable is not only an attractive garden shrub, but has potential as a plant for further hybridizing. As a contribution to the garden, the dark glossy foliage 4" long, embraces a neat framework of branches. In spring the new growth is light and almost silvery with pink leaf bracts standing out in soft contrast. The truss is globular with flowers 2 inches in diameter, a bit larger than those of *maximum* but distinctively different in color. Each is edged dark salmon pink, lightening to subdued pink in the throat. For the hybridizer, the plant has the potential hardiness of *maximum* without its coarse undesirable qualities. *Haematodes,* a specie of elegance with its waxy bell-shaped flowers and spreading compact habit, deserves the 4-star rating given it by British and American standards. Blooms mid-May. Hardy zone 6.

One plant per customer.

9" - 12"	$ 7.00
12" - 15"	$10.50
15" - 18"	$13.50

CAUCASICUM - We offer this primarily as a collector's item. In true *caucasicum* fashion, the plants being offered have never bloomed though nearly 10 years old. As a shrub it is strikingly novel, forming a squat densed half-dome with short stiff stems 2 or 3 inches long covered by almost black green foliage, deeply grooved along the midrib with veins impressed. The bright chartruese leaf buds, an inch long standing out in sharp relief against the foliage, always appear in clusters of 5 or more. Gable tells me it requires about 15 years to bloom. The truss is candelabroid. The flowers are 2 inches wide and the color moderate yellow. It originates in the Caucasus at an elevation of 6,000 to 9,000 feet between the Black and Caspian seas. Hardy zone 6. One plant per customer.

15" - 18" spread	$10.00
18" - 21" spread	$12.00

FORTUNEI - Named after Robert Fortune the plant explorer who found and introduced it to England in 1856, it is considered his finest discovery. Growing in Chekiang in eastern China, at an altitude of 3,000 feet where rainfall averages 40-60 inches a year and temperatures drop to 20 below zero, it is one of the hardiest Asian species to be introduced. As a parent in hybridizing, it has proven an invaluable asset and has influenced the modern hybrids for colder climates perhaps more than any other exotic Rhododendron. It does not lack beauty in it own right. In its natural habitat it matures a shrub a dozen feet high and 15 or more in width. The leaves are large—6 to 8 inches long and 1 to 3 wide. The fragrant truss is loose, not floppy, decidedly attractive, comprised of from 6 to 12 individual ruffled flowers pale blush to nearly white, each 4 inches in diameter. Blooms early to mid May. Hardy zone 6 and milder sections of zone 5.
One plant per customer.

9" - 12" ..... $ 5.50

DAVIESII - When an old, old, hybrid maintains its appeal, especially to those of sophisticated taste, amid a deluge of superior introductions, that plant deserves renewed recognition. 'Daviesii', an old Ghent hybrid is one of these plants. It was popular long before the Exbury hybrids existed and is again attracting revived interest. Most of the growing season the foliage is a smart glaucus. The flowers are white with a yellow blotch and faint diffusing of yellow toward the center. It has a very strong but pleasant fragrance. Daviesii is a woodland plant and must not be trimmed to any formal shape. As a small plant in bloom it belies its true beauty. From about 3 feet and larger it takes its place side by side with the finest of the new. Blooms late May, early June. Hardy zone 5, possibly milder sections of zone 4.

12" - 15" ..... $ 6.00

Anyone who has constructively contributed to society deserves to be gratefully remembered. Unfortunately, this is not always the case, and sad but true, Charles Dexter is one of these men.

During his lifetime of hybridizing at Sandwich, Mass., he produced many fine hybrids with enormous fragrant flowers in unusual colors. The best of these plants have been preserved, evaluated, and some are now being propagated.

Following his death, the Rhododendrons in his nursery were largely sold, and unnamed seedlings by the truckload were removed and sold as "Dexter hybrids." True they were hybrids, but by far the overwhelming majority were inferior or totally worthless seedlings, plants which should have been destroyed in the normal process of a hybridizing program. In addition, seeds were gathered from these hybrids and then in turn sold as "Dexter hybrid seedlings." The injustice has continued for many years, and opportunists or men honestly ignorant of the facts reap a harvest at the expense of a man's name.

In the years to come, when a more enlightened public refuses the purchase of these worthless seedings, their dissemination will cease, and selected clones propagated from cuttings will be sold in their stead. Then once again the name Dexter will be restored to its former place of high esteem, side by side with the other "ageless" of the Rhododendron world.

We have many Dexter hybrids under propagation. This year we offer one: DEXTER #9 — One of Dexter's favorite shrubs and used by him a great deal in his hybridizing. Actually, it is not a hybrid of Dexter's, for he purchased the plant from Farquhar's Nursery in Barnstable, Mass. To trace back further, Farquhar purchased his plants from Robert Veitch of Exeter, England. Robert Veitch sold the plants, from which 'Dexter #9' was later selected and named, as *fortunei* seedlings. Obviously, it is a *fortunei* hybrid of unknown parentage.

The authenticity of the stock plant from which our cuttings of this clone have been made has been verified many times. Our plant is a layer made from the original shrub at Sandwich, Mass., in 1928. When the plants of the Dexter Estate were being sold after his death, Edmund Amateis bought '#9' from Colonel Roy Brown, who purchased the nursery from the Dexter Estate. I, in turn, bought it from Edmond Amateis.

'Dexter #9' is an exciting hybrid, and by far the most fragrant in my garden. The flower color of pale peach-pink is not usually seen in hardy Rhododendrons. The florets (individual flowers) measure 3" in diameter, and a cluster comprised of about 10 florets makes an imposing sight. At Rochelle Park, '#9' blooms mid-May. It has never been injured by winter here. After severe winters in its exposed location, the flower buds have been damaged at Brewster, N. Y. I would assume, since it was a favorite of Dexter's, that it performed satisfactorily at Sandwich, Mass.

12" - 15" $12.50

15" - 18" 17.50

'Dexter #9' is now 'Skyglow'

The "ironclads" require no introduction. Their unfailing performance during the most difficult winters and summers have justly earned for them an excellent reputation and extensive distribution. Lately however, with the swelling influx of new and virtually untried hybrids, these admirable old "classics" have been invidiously disparaged. Despite this deluding advertising, I have not found any of the new introductions from abroad able to supersede the old hybrids under conditions of severe climate. For regions of rigorous winters they are to this day unrivaled, and many are of sufficient beauty to be insinuated without apologies in the more temperate gardens.

AMERICA — This old hybrid is the finest of the hardy reds. The large, handsome candelabroid trusses of close-fitting florets make a splash of brilliant red every spring. A prolific blooming hybrid dressing itself in gleaming masses of bloom of great substance, it appears equally at home in sun or semi-shade. Blooms mid-May. **Zone 5.**

12" - 15" ..... $ 5.75

BOULE DE NEIGE — At all times a superlative plant, no other old hybrid has attained such lasting fame as 'Boule de Neige.' So magnificent are its habits of growth and foliage that, were it never to bloom, it would still have much to commend it. But without fail every spring in early May the pure, snow-white, delicately frilled globular trusses rest like crown jewels on rosettes of dark green leaves. The "king" of this majestic race of hybrids, it is every cell and fiber of royal blood. It still remains, in its type and in its early season of bloom, second to none. **Zone 5.**

10" - 12" spread $5.75

12" - 15" spread 6.75

NOVA ZEMBLA — A fetching red hybrid many claim to be equal or superior to 'America.' Side by side in bloom, it is difficult to distinguish one from the other. The flower of 'America' is reputed to possess slightly more substance, holding up longer under the direct rays of the sun, but in foliage no red can match the dark polished leaves of 'Nova Zembla,' and its habit is almost equal to that of 'Roseum Elegans.' Blooms mid-May.

12" - 15"	$5.75
18" - 21"	7.75

For those desiring mass plantings of ironclads, we offer advanced bedded liners in the 10-12 inch size.

Sold only in multiples of ten, $37.50 per ten, your selection.
We offer the following:

Nova Zembla (red).
'America' (red)
'Caractacus' (red)
'Ignatius Sargent' (light red)
'Everestianum' (frilled rose-lilac)
'Purpureum Grandiflorum' (dark purple)
'Album Elegans' (late white, tall growing)
'Catawbiense Album' (white)
'Roseum Pink' (rose-pink)
'Boule de Neige' (dwarf early white)
('Boule de Neige' slightly smaller)

The words "hybrid Rhododendron" have acquired a new connotation in the last few years. We no longer visualize only the large leathery-leaved plant with hugh mounds of bloom sitting atop terminals in mid-May. The needs of the more confined outdoor living-room and the desire to utilize Rhododendrons more extensively in foundation plantings, have brought small-leaved Rhododendrons to popularity, and with them an extension of the period of bloom. Conveniently placed in the more confined areas, and easily kept within bounds by periodic trimmings, the small-leaved, slower-growing Rhododendron appears destined to outstrip its larger brothers. Listed here are half a dozen of the more desirable small-leaved Rhododendrons;

GABLE'S 'PIONEER' – NEW – DIFFERENT – SUPERIOR

We are proud to have worked in conjunction with Joseph Gable in the introduction of this new hybrid. Our enthusiasm has been justified by the unbounded praise it has received. During the eight years we worked with this plant in preparation for marketing, we eagerly sought objective opinions on its merits. We asked amateur as well as professional growers, and by and large the reports corroborated our belief,-that here was a plant truly different and superior.

A chance hybrid between Gable's 'Conemaugh' (*racemosum X mucronulatum*), 'Pioneer' has inherited the hardiness, vigor, and adaptability of *mucronulatum,* combined with the compact and floriferous nature of *racemosum.* It possesses the rare attribute of *blooming in the axils of its leaves along the stems* in addition to having multiple terminal flower clusters. 'Pioneer' in full bloom is a stunning sight. It is the most prolific blooming Rhododendron I have seen, and I have seen many. An average 15-18" plant as offered in our list, will have between 400 and 500 individual flowers. As an evergreen shrub the remainder of the year, this well-branched plant is clothed in leathery, highly burnished foliage, which makes it an acquisition as a lasting garden decoration. It begins blooming in mid-April as the species *mucronulatum* finishes, extending the blooming period another ten days to two weeks.

One of the few hybrid Rhododendrons to excel in full sunlight, where it loses none of its charms, 'Pioneer' may safetly be situated in any location of the garden. Many people, on seeing our rows of field grown plants, have sincerely suggested this plant may well be something new in hedging.

12" - 15" heavily branched, field grown, budded	$ 7.50
15" - 18" heavily branched, field grown, budded	10.50
18" - 21" heavily branched, field grown, budded	12.50

WYANOKIE—Another top quality creation of Guy Nearing's that we expect to gain the popularity of 'Windbeam.' It might be called a dwarfed white 'Windbeam.' Its exact forebears are not known but it is believed to be a 'Conestoga' seedling, and Guy Nearing suggests the parentage to be 'Conestoga' crossed with *carolinianum album.* 'Conestoga' is *carolinianum X racemosum.* The bush habit is dwarfed and twiggy, with an average growth rate of 2 inches a year. The foliage is almost identical with "Windbeam' and like 'Windbeam' colors a bright bronze in autumn. It blooms early May.
Hardy zone 4. One plant per customer.

12" - 15"	$ 8.50
15" - 18"	$10.50

WINDBEAM — This semi-dwarf hybrid is a Nearing introduction from a batch of 'Conestoga' (*carolinianum* X *racemosum*) seedlings. A plant of much refinement and character, it is a creation of which the originator can be more than a little proud. Although setting flower buds at an early age, it makes its debut for acclaim after its fourth or fifth year, when terminals are covered with multiple buds. Opening white, the blooms gradually change to soft pink blanketing the plant with mounds of bloom in graceful proportion. The highly aromatic somewhat elliptical leaves are evergreen and do not curl until temperatures dip far below zero, adding one more reason for this plant's continued rise in popularity. Blooming after winters of nearly 20° below zero, it will probably have wide distribution. With its beauty rivaling that of the more tender exotics, 'Windbeam' seems assured of a permanent spot in our landscape.
zone 4. Blooms early May. See color photo

10" - 12"	$6.50
12" - 15"	8.00
15" - 18"	$10.50
18" - 21"	$12.50
21" - 24"	$16.00

RAMAPO — Another Nearing introduction from a cross between *carolinianum* and *fastigiatum,* it is one of the truly hardy dwarfs expressly suited for a prominent place in the rockery, along the border, or in the foreground, wherever ericaceous material is desired. At home either in sun or partial shade, 'Ramapo' possesses a distinctive character unlike that of any other hardy hybrid. Although often referred to as a "blue" Rhododendron, it is in reality a brilliant, pale violet. A sublime Rhododendron at all seasons, the light blue-green foliage which persists through early autumn is in itself a valuable asset. I have never known it to be damaged by winter in this area. Hardy zone 4. Blooms early May.

10" - 12"	$ 8.00
15" - 18"	$12.00

KEISKEI — From the provinces of Simabara and Owari on the island of Japan, which has so richly embellished our floral world, comes yet another plant, a yellow-flowered Rhododendron, *keiskei,* named to honor the Japanese botanist, I. Keisk. A low, compact shrub with leaves nearly two inches long and half as wide, displaying during mid-April pure lemon-yellow flowers about one inch long and wide, with contrasting red anthers, it is the first yellow-flowered species of the genus Rhododendron suitable for our northern conditions.

The plants herein offered are seedlings, *NOT* rooted cuttings, for it is advisable to grow species from seed. They are Guy Nearing's selected strain developed through many generations, by retaining the superior and discarding the inferior, by constantly improving plant habit, vigor, hardiness, and flower quality. Hardy zone 6.

10" - 12" $7.00

RACEMOSUM — Above timberline in Yunnan and Sikkim provinces in the Himalayan Mountains of China, at an elevation of 7,000 to 9,000 feet, there flourishes in great abundance along the craggy hillsides the dwarf Rhododendron species of the Virgatum Series, *racemosum. Racemosum* in cultivation will scarcely reach twenty inches in height in as many years, and as can easily be imagined from this deliberate growth rate, the habit is twiggy and compact, especially well-fashioned to the rockery or bank. It bears small leaves silvery-white beneath, dark green above, the size of a child's fingernail, and blooms in mid-May in a burst of beauty from clear pink to pinkish-white flowers, both terminal trusses and racemes in delicate balance.

In its natural environment *racemosum* enjoys mild temperatures, periodic bathing in mists of the monsoons, and the cool days and nights that accompany high elevations. In this country in the majority of gardens, conditions are precisely opposite—low elevations seldom over 3,000 feet, long cold winters, and hot dry summers. With such ecological extremes between its native home and the garden, it is not surprising the first attempts to establish *racemosum* in cultivation met with disappointment.

Our plants are a hardy strain of *racemosum,* —what might be termed "a hardy variety of a somewhat tender species." It did not evolve by mere chance but as the result of a few decades of painstaking breeding, selecting, discarding, over and again through many generations by the prominent botanist, Guy Nearing. It is actually Guy Nearing's form of *racemosum,* bred for our climate and terrain. Hardy zone 6.

8" - 10" $4.50

10" - 12" 7.00

CONEWAGO — A Gable hybrid between *carolinianum* and *mucronulatum*, 'Conewago' extends the blooming season another 10 days or more. It begins blooming the last week of April as 'Pioneer' is ending its bloom. Another small-leaved hybrid of extreme hardiness, 'Conewago' is best suited to the woodland setting, where in the late afternoon with lengthening shadows and a weakened sunlight, the pleasing pastel shades are further softened and tinted, giving the appearance of a very delicate pink with a slight lavander cast. The full, round, open florets measuring an inch and a half in diameter number two to five per bud with most terminals having multiple buds. The actual color registers Amaranth Rose (530/3 to 530) on the Horticultural color chart.

See color print — Hardy zone 4.

15" - 18"	$ 8.50
21" - 24"	$11.00

EXBURY (De Rothschild) DECIDUOUS AZALEA HYBRIDS

Over two hundred years ago the trading vessels of the British and Dutch merchant fleets brought back to England from the eastern coastal areas of America the first deciduous Azaleas, forebears of today's Exbury hybrids. A brief history of the hybridizing of deciduous Azaleas leading to the development of the present-day Exbury hybrids follows:

About 1740 the American species *calendulaceum, viscosum,* and *roseum* or *nudiflorum* appeared in England. Doubtless, they were then disseminated by seedings throughout England and parts of the Continent. Half a century later, the yellow-flowered pontic Azalea from the Caucasus Mountains of Europe (between the Black and Caspian Seas) found its way to both England and Holland. Hybridizing of these species began on the Continent and in England by many enthusiasts, but credit for creating the Ghent hybrids (the first race of deciduous Azaleas) goes to a baker named Mortier of Ghent, Belgium, who commenced his hybridizing in the early 1820's. He later passed his work on to another and the hybridizing continued. New species were included, hybrids were crossed with hybrids, or with species, and so on for nearly 80 years, with the list of Ghent hybrids continually growing to their present number of more than 200 different clones.

Also in the early 1800's, ships returning from the Orient brought back to England plants, seeds, or both, of the Chinese Azalea, *molle.* In 1860 plants of Azalea *japonica* (the Japanese counterpart of R. *Mollis*) were on the Continent. In the beginning, the first so-called "*mollis* hybrids" were no more than selected seedlings of Azalea *japonica,* but later named cultivars were developed from crosses with the Chinese Azalea and undoubtedly crosses were made with the Ghents and with the American species.

However, it was in England about 1870 that the present-day Knaphill-Exbury Azaleas began their development by the hybridizing results of the late Anthony Waterer of Knaphill Nursery who used *mollis-japonicum* hybrids, and American species including *occidentale* from the west coast of America. Then in the early 1920's the late Lionel De Rothschild obtained from the Knaphill Nursery those plants he was to use for his hybridizing in the creation of the now-famous Exbury deciduous Azalea hybrids. His method of hybridizing was quite simple. Having chosen from the Knaphill Nursery the most superior sorts he could locate, he bred color to color (red to red, yellow to yellow, etc.) and raised seedlings in vast quantity. From these, he selected only a very few which he considred conspicuous improvements in flower color, size, and fragrance. He ruthlessly destroyed the inferior and, having achieved his goal, he left as a lasting legacy this new race of hybrids, outstanding in beauty and grace.

We offer a few of these selections. Our plants are propagated from cuttings (not layers) from stock plants obtained directly from the Exbury Estate, England. They have been tested in Rochelle Park for nearly 10 years and have withstood sub-zero temperatures without injury to either flower bud or plant. Our plants are field grown in a soil-peat medium. We do not grow any plants in pure peat moss.

'Gibralter' - intense brilliant orange; mid to late May
12" - 15" ..... $ 7.50
18" - 21" $13.50
'Fawley' - pure white, flushed pink; late May
15" - 18" $10.50
21" - 24" $15.50
24" - 30" $17.50
'Scarlet Pimpernel' - red, fire-orange blotch; early June
12" - 15" ..... $ 7.50
21" - 24" $15.50
24" - 30" $17.50
'Berryrose' - carmine, lemon-yellow blotch; mid-May
21" - 24" width $15.50
24" - 30" width $17.50
'Brazil' - burnished orange; early June
12" - 15" ..... $ 7.50
'Cecile' - bright rose, orange-yellow blotch; late May
10" - 12" ..... $ 7.50
21" - 24" $17.50

The assortment of evergreen Azaleas has become ridiculously numerous and confusing. Many appear almost identical and some under different names are so similar that a microscopic examination is in order to distinguish one from the other. Yet all are advertised as "superior" and quite select in some way or other. Catalogues run wearisome lists that almost equal a small telephone directory in size, and the gardener or specialist is left without guidance.

We have discontinued all evergreen Azaleas except those beautiful creations of Joseph Gable, which have proved hardy through years of trial. There never will be listed any two that are similar. This season we offer seven.

'Springtime' (A-11-G). One of Gable's hardiest hybrids and a very early blooming clear pink. Single. A second generation hybrids of *poukhanense* X *kaempferi.*

'Stewartstonian' (R-5-G.) Gable's latest Azalea release named for his home town, Stewartstown. A low-growing red similar in habit to the old favorite 'Hinodigiri, or 'Hinocrimson,' with slightly more vigor. The flower color is intense fire-red or scarlet-red with no trace of blue whatever. On the spectrum it leans toward orange, but so minutely that no orange is visible in the flower.

'Rosebud' (B-5-G). To quote Gable: "Miniature roses on a dwarf, slow-growing plant, it is especially beautiful in stages of the opening bud." The planned hybridizing leading to the development of 'Rosebud' was quite complex. His purpose was to combine the double flowers of 'Louise Gable' (13G) with the hose-in-hose flowers of 'Edna' (34G) to develop a full hose-in-hose double. The cross was as follows: *indicum* X (*poukhanense* X *kaempferi*) crossed with (*poukhanense* X *'Hexe'*) X (*poukhanense* X *kaempferi*). He obtained his objective with the fully double flowered 'Rosebud.' It is one of the few Azaleas that will probably never require pruning. A growth rate of a quarter or less than that of average evergreen Azaleas, it is a plant with intrinsic charm in its miniature stature and spangled rose pink bloom.

Of the more than a millon plants in the trade under the name "Rosebud," only a mere handful are actually 'Rosebud.' Our plants are true, the cuttings having come directly from Gable's 'Rosebud' in his test garden.

'Delaware Valley White' — In offering this superior white we feel justified in deviating from our intention of only selling the Gable evergreen azaleas. Actually our purpose is to make the best possible available to our customers and fulfilling this purpose is our prime objective. We have grown many whites, and are testing others at present. To date no other white azalea has performed so satisfactorily all the year round. 'Delaware Valley White' is low-growing and compact. The flower is pure white resembling a broad star. Hardy zone 6.

Jimmie Coover — (J-11-G) This macrantha hybrid blooms at Rochelle Park the end of May or early June in a blaze of fire-red. Its habit of growth is unique, arching its branches to the ground. Plants two feet in diameter are not 10 inches high. Hardy zone 6.

Louise Gable — (13G) This most beautiful of all hardy double salmon pinks is a hybrid of *indicum* X (*poukhanense* X *kaempferi*). So highly does Gable value this plant that he told me if the object of his hybridizing were to make money he would have stopped with 'Louise' and propagated it to the limit. After the first few years the plant requires little or no pruning. The growth rate is slow, but it is not a dwarf. Hardy zone 6. See color photo.

'Boudoir' — Though a Gable hybrid, this one was not named by Gable. The flowers are single clear watermellon pink. Its growth habit is slightly wider than high. Blooms mid-season. Hardy zone 6.

'Boudoir'	10"-12"	mid-May	$3.50
'Springtime'	10"-12"	early May	3.50
	18"-21"		5.50
'Stewartstonian'	12"-15"	mid-May	4.50
'Rosebud'	8"-10"	late May, early June	3.50
	12"		5.00
'Del. Valley White'	10"-12"	early May	3.50
'Jimmie Coover'	10"-12"	early June	3.50
	15"-18"		4.50
'Louise Gable'	12"-15"	late May	4.50

PINK MUCRONULATUM

In the colder areas of the United States and Canada where Rhododendrons can be grown, *mucronulatum* officially ushers in the spring of Rhododendron bloom. Unfortunately its washy, weak solferino-purple flowers offer little else than a sign spring.

The search has been on for many years to find an improved flowered form of this species. We have it . . . a pure, clean, shimmering pink of the most eye-appealing tint, equal to — and attested by many to be superior to — any pink in the trade at this time.

15" - 18"	$10.00
21" - 24"	$12.00

TERMS AND CONDITIONS OF SALE

The nursery, comprising nearly 50,000 Rhododendrons in the many stages of development, is operated solely by my wife, Susan, and me. All plants are given individual attention, a vital necessity in the development of first class material. A strict work schedule must be maintained to properly cultivate such a large number of plants. Therefore, it is regrettable, but there can be no retail sales on the premises — at least for the present.

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All plants B&B

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New Hardiness Zone Map

ASEXUAL PROPAGATION

There is a new wave of enthusiasm for hybrid Rhododendrons. In decades past, Rhododendrons were largely the plants of the wealthy, destined for estates and tended by hired gardeners. Today the home owner is the gardener. Often accompanying the revived interest in Rhododendrons is the desire to propagate them.

In the past propagation was considered a cryptic art attempted only by specialists. The method mainly employed was grafting. The rooting of cuttings was considered impossible, and layering was usually too slow commercially.

A better understanding of the plants' requirements and the application of synthetic hormones has changed all this, so that successful propagation by cuttings is now within reach of everyone. However there seem to be conflicting opinions as to which is the best means of propagating and what the requirements are for successful propagation. One view is that a greenhouse equipped with costly automatic mechanical gadgets is essential. In addition a miniature laboratory seems a requirement for hormone treatments and secret research. Some nurseries are so fastidious that in the "inner sanctum", the greenhouse, hospital-like sanitary precautions must be religiously observed, and the propagator, like the surgeon, is hygenically spotless in his white coat. In other greenhouses smoking is prohibited, presumably lest the cuttings get the habit and require nicotine daily.

Actually Rhododendron propagation is a very simple process and ought to be treated as such. The essentials are few and easily attained at nominal expense. They are: maximum light without direct sun; high atmospheric humidity surrounding the cuttings; porous rooting medium; and proper hormone treatment.

The method herein outlined is the modified Nearing method. It has been successfully employed for years in our nursery and is in use by amateur gardeners both in this country and abroad.

The rooting shed, best described by the photos, is made of cypress or redwood. Frames built to these specifications will last over 20 years.

The rooting box of 1 x 12 cypress or redwood is partitioned in the middle forming two separate units each 34 inches wide and 70 inches long, (inside measurements) 12 inches deep at the outside end, and 18 inches deep on the inside (the partition). On top of each unit conveneiently fits one standard hotbed sash sloping toward the outer end. To obtain this pitch a 1 x 6 board 72 inches long is nailed on the front and back of each unit beginning at the partition and sloping towards the outside ends; "A" in the photo. The bottom

is nailed as tightly as is convenient without the use of clamps. The wood for the framework of the superstructure can be practically any width and thickness. 1 x 3 does the job as well as 2 x 4's. It rises 60 inches above the box on the front end (facing north) and 12 inches above the box on the back end. Care should be taken in nailing on the roof or shade that it does not reach the ground. This space seems necessary for air circulation, preventing the accumulation of hot air during the summer.

Once constructed the frame should be oriented, the open end facing dirctly north. Unless the variation correction on the compass is understood, the north star, polaris, which is easily identified by nearly everyone, is the safest marker. In its orbit it never varies more than one degree east or west of true north, which is insignificant. In the area where the frame or frames are to be set, sight on the north star with three sticks forming a line. In tests made by Mr. Nearing with Rhododendrons where the frames were intentionally offset 15 degrees east and west of true north the cuttings soon died. Whitewashing the glass may have prevented this but it would defeat the purpose of the frame: to offer the cuttings as much reflected light as possible without any direct sunlight. Then too with the sun beating down on the frames during the middle of the day or thereabouts, watering must be increased. True during that time of the year when the sun rises north of east and sets north of west, rays do strike the glass in the early morning and late afternoon. The angle is so small most of them are mirrored off the glass and those that do enter the frames for only a short period are not very intense and are innocuous. Place your frame in as bright a location as possible. The depth it is to be set in the ground depends on the water table in your locale. Under the driest conditions it should not be sunk more than 10 inches allowing 2 inches out of the ground at the shallowest end. Earth may be mounded against this, grading away from the units, as in the foundation of a home. If sand is used, weeds are kept at a minimum and during the rainy seasons prevents muddiness.

Care should be taken to make certain the frame is level. Do not trust the naked eye for this as the slighest tilt will cause extra work in preparing the medium and later in watering. The measures of the various substances comprising the medium are figured for the size unit described above. If a larger or smaller unit is desired the medium should be altered proportionately, since for unknown reasons this combination produces higher rooting percentage with continuity.

Into each of the two units in a frame are emptied and leveled three bushels of shredded commercial peat moss. On top of this are added two bushels of shredded commercial peat moss thoroughly mixed with two bushels of washed

coarse masonry sand. This too is carefully leveled. Thinly spread over this is a ¼ inch of coarse masonry sand which prevents the peat moss from floating with watering. Into this medium the cuttings are set. They are spaced approximately 2½ inches apart in the row and the rows are approximately 2½ inches wide allowing about 250 to 300 cuttings per unit or 600 per frame. Cuttings are never crowded so that leaves overlap to any extent. In rooting, carbohydrates plus nitrogenous substances are required, which are synthesized in the leaf. Hormones alone are not the answer. So it is necessary on inserting the cuttings, that they be so arranged that each leaf receives the maximum amount of light. The peat moss used, aside from being acid and having average water retentive capacities, may be of any brand. (Some peats are deceiving and absorb very little water. This may be tested by filling a container with half water and the remainder peat,—dry peat. Some peats absorb all the water and are not fully wet themselves while others absorb all possible and the container still has free water remaining. Since the bottom layer through evaporation and vaporization keeps the upper layer moist, a peat able to retain a large amount of water should be preferred.) Then water the unit with a light sprinkle so as not to disturb the level. Watering is continued until it rises about ¼ to ½ inch above the sand. The initial watering understandably takes longer than the rest for it is here that the peat moss takes on a large quanity of water. The sash is placed and the frame is ready for cuttings. For Rhododendrons do not choose a sand too coarse or too fine. A sand too coarse dries rapidly and one too fine will not provide proper aeration. In the latter case roots will strike on the surface of the sand and down to a depth where lack of oxygen prohibits growth. Under these conditions rooting is usually poor. Where Rhododendrons alone are concerned a plaster sand is much too fine when used by itself. For Rhododendrons, a sand that will pass 100% through a 3/16 inch screen and 80% of this through a 50 mesh screen, is very satisfactory.

In New Jersey we make our Rhododendron cuttings in the autumn any time after the middle of September through the middle of October, but this will vary with the area under consideration. The wood of the second growth is removed after it has hardened, or is "ripe." To explain the feel of a "ripe" cutting presents a problem and finding one variety ripe is no indication that all are ready, since inherent qualities characteristic of the individual variety govern this factor. In the hybrids it may be traced back to their progenitors. Fortunately being so exact in selecting the correct time is not critical or at least has never proved to be with this method where over a period of years cuttings of the same varieties set at dates varying from late August to late October rooted almost identically. Cuttings are ready after the stickiness has gone, when the leaves have fully obtained their natural color, and they are rigid enough not to wilt should a hot day occur. Postpone the making of cuttings a few days

or a week if in doubt. The number cuttings that can be taken from a plant varies with the growth characteristics of the shrub. Most plants in their adolescent years send up two flushes each year. Under this circumstance, the entire second growth can be removed with absolute safety to the shrub. After blooming age has been reached, the second growth is often sacrificed for flower bud development. When this change takes place it is best to remove only ⅓ the terminal tips, although at times we have removed over 50% without harmful results.

The cuttings should not be over 2½ inches in length and those as short as 1½ inches develop into equally fine plants. If cuttings are longer than the above specifications, they will protrude into the soggy peat, often rotting. Keep the cuttings on the short side. The contention that a short scion (cutting) makes a small plant is drivel.

Along the shank of the cutting inflict a wound with a knife or other sharp instrument about an inch long and deep enough to cut away a small sliver of the xylem. A cutting thus treated will root not only along the bottom but on the side, forming a well-balanced root system—the main requisite of a mature specimen. Before treating the cutting with hormones, the number of leaves per cutting must be reduced to three. A cutting usually has from 7 to 9 leaves per rosette. Pull or cut off all but three spaced equidistantly around the stem. The leaf length varies according to the clone and conditions under which it is grown. Our leaves are trimmed to be no longer than 3 or 4 inches and spaced or fitted to prevent excessive overlapping, as previously stated. No cuttings are used with flower buds. If there is no choice and shoots with flower buds must be used, the flower buds are removed before inserting the cuttings.

Before inserting into the rooting medium, all cuttings are soaked for about 15 hours, exact timing having no noticeable effect on rooting, in 3-indolebutyric acid, at strengths from 35ppm (parts per million) to over 600ppm depending upon the rootability of the clone. As a standard we use 75 ppm for everything as basic dip and either reduce it if too strong or increase it if the results show the necessity of a change to a stronger dip. When we began working with the prolonged soak method, we measured the quantity of water to the nearest cubic centimeter to assure accuracy. We later learned such accuracy was unnecessary. For a container use a gallon cider jug or its equivalent. Along the outside measure up 7½ inches and score a line with fingernail polish or crayon. Fill the jug with tap water to this point. We have compared well water with city water, but found no appreciable difference. The hormone must be dissolved into solution before being added to the jug of water. This step

MUST be done correctly. Indolebutyric acid cannot be dissolved in water. It is dissolved in alcohol and the most suitable alcohol for this purpose is ethyl. It can be obtained from a druggist. It is 95%, 190 proof, unmedicated and the purest grain alcohol available. As a substitute a 70% medicated isopropyl alcohol can be used but the ethyl alcohol is preferred. In a vial graduated in centimeters, pour 8 cubic centimeters of ethyl alcohol. To this add 250 milograms indolebutyric acid. Shake well until it dissolves. This takes from a few minutes to 10 minutes or more. After it is dissolved add 8 cubic centimeters of water. Shake well. There should be no crystalization at this point. If there is, it is easily seen. The vial becomes alive with rod-like sparkling crystals. If this happens the hormone or most of it has solidified and is useless. This will not occur if the hormones are fresh, they have been properly dissolved, and the 8 cubic centimeters of water added to the alcohol are not exceptionally cold. The solution is then added to the gallon jug, making a mixture of 75 ppm and enough to treat nearly 1,000 cuttings. It is as simple as that.

To soak the cuttings we use pyrex trays over which is placed half-inch wire mesh. Cuttings are fitted, usually 2 or 3 per square. A tray 15 x 9 x 2 inches deep conveniently holds 300 to 400 cuttings. Care must be exercised not to squeeze or force the cuttings too tightly in the mesh openings for fear of injurying the bark. Where this has been done, the injury often rots. No special enclosure or other conditions are provided for the soaking of the cuttings. Trays are placed indoors or out in a semi-shaded location. On being removed from the trays the cuttings are immediately wrapped in either wet burlap or polyethelene to prevent drying and set in the frames with the least possible delay. The cuttings are set (no deeper than the lowest leaf petiole) in holes made with a marker (shown in picture). Cuttings are watered in, not tamped. The rooting medium is drenched until a layer of water rises above the sand, momentarily. The glass is then fitted tightly over the cuttings and left undisturbed until the next watering. The time between waterings varies according to the season. As a rule we water once a week in September; once every two weeks in October; once during November; not at all during December, January and February; once or twice during March; once each week during April; about every 5 days during May and to the middle of June. By this time most are rooted. During July and August until the cuttings are removed from the bins, watering is continued at the rate of about once a week or less. The sheds must never be watered while the medium is frozen. To test for this, force a finger or stick into the medium. It should go to the bottom of the frame. If not, postpone watering until this is possible. During the cold weather the water requirements of the cuttings are very slight, especially when frozen.

In July or August cuttings are transplanted from the rooting bins into 14 x 20 x 4 inch cedar flats, 24 cuttings per flat. The flatting medium consists of 2 parts shredded commercial peat moss, 1 part sifted or shredded top soil, and ½ part Michigan peat. In this mixture a strong root system has its genesis and the cuttings develop into young plants able to withstand a winter outdoors. The medium is friable so that it will not remain soggy after drenching rains. Also the physical structure, chemical and mineral composition of the mixture are similar to that in the planting beds into which the cuttings are to be later moved in the spring, so that the shock of moving will be reduced to a minimum. Many propagators use 100% commercial peat moss as a flatting or potting medium for newly rooted cuttings, but I consider such treatment not to be in keeping with the best interests of the plants. Biologically, nutritionally, and minerally it is a poor medium for roots. Although large root masses form, these roots often fail to leave the peat upon transplanting into the soil. In addition the peat ball remains intact for many years, holding excessive moisture during periods of prolonged rainfall.

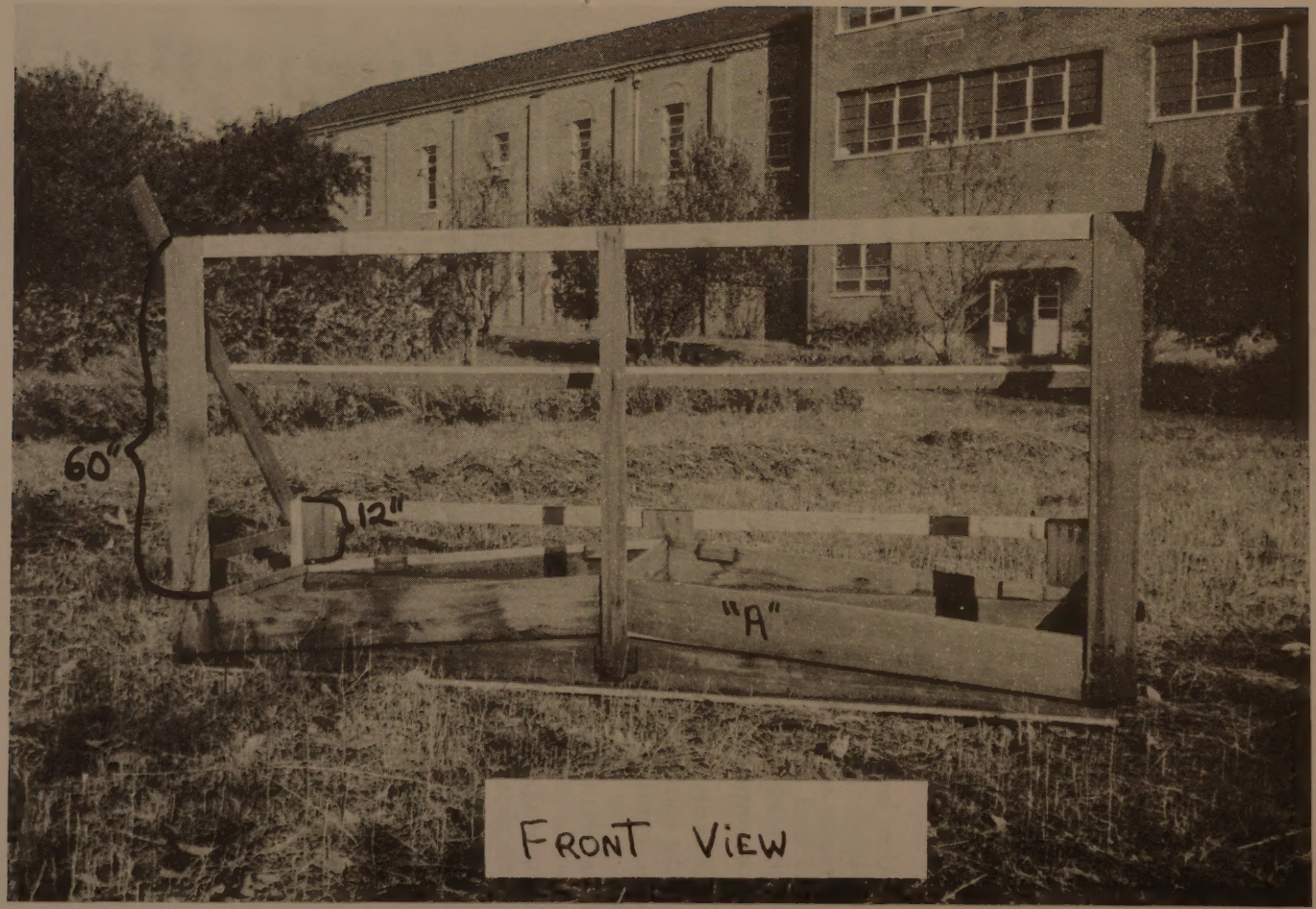
After being flatted, the cuttings are placed in a cinderblock frame and are shaded. The height of the frame is determined by the four courses of 8-inch blocks set up dry. The dirt floor of the frame on which the flats rest is ground level. While it would appear to be advantageous to use a deep pit for overwintering, I do not have the experience with such a frame on which to pass comment.

In early October the lath shading is temporarily removed, glass is placed over the cuttings and the shading replaced. Each sash is propped open a few inches at this time. The purpose of the glass being to keep off autumn rains allowing the soil sufficient time to dry and become aerated before freezing weather sets in. The beginning of November the glass is closed tightly on the frame and left undisturbed until the end of the year, at which time the lath shading is again temporarily removed and a sisal-craft paper covering is placed over the glass. The lath shadding is then replaced to hold down the sisal-craft. The paper covering prevents the direct ray of the sun from entering the frame causing wide temperature fluctuations during the open days of winter. It remains in place until mid-March. Such a covering does not place the inside of the frame in total darkness. Cracks in the cinderblocks, and glass imperfectly seated allow enough light to enter that the inside of the frame has the appearance of dull twilight. (After the glass is placed over the flatted cuttings in October, they are only watered occasionally and then merely sprinkled to prevent drying. Before freezing weather of winter, depending on the climate, the flats are given a final watering until spring.)

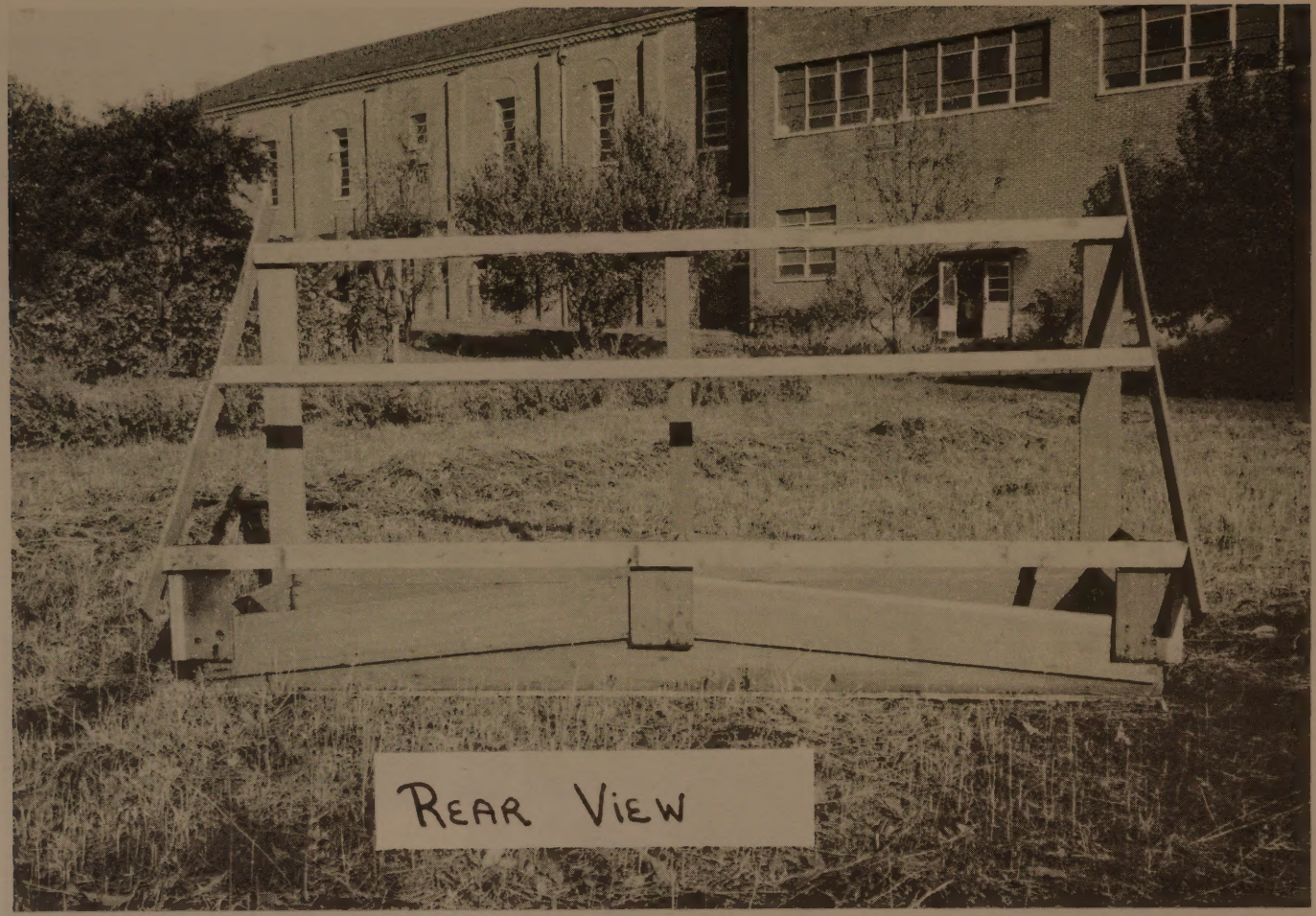
In mid-March before the sun and warmer weather warm the inside of the frame, the sisal-craft paper is removed and the glass again ventilated. This vetilation prevents overheating and stimulation that might occur during excessively clear days the latter part of March. The beginning of April, as weather permits, the glass is removed and the plants bedded out, mulched and shaded.

The first season the little plants do not receive any commercial fertilizer.

Indolebutyric acid may be purchased from us in 250 milogram packets for $2 each.



FRONT VIEW


REAR VIEW

MARKER

PLANTING INSTRUCTIONS

Rhododendrons are one of the easier ornamentals to grow, and in fact if properly planted, thrive on neglect. They require a porous soil that is acid containing liberal amounts of organic matter; a location not buffeted by high winds affording some shade; and a mulch. For adequate soil there is no substitute and, although Rhododendrons will tolerate moderate deviations from correct location with a reasonable degree of graciousness, and are tolerant of a wide variety of mulches, they will only do so if planted in the proper soil. This is vital.

Rhododendrons have a fibrous root system. There is no main root but instead a complex branching of multitudes of small roots which neither reach to great depths nor fan out far beyond the periphery of the branches. The very fact that theirs is a somewhat confined life makes it possible to easily transplant Rhododendrons at almost any age or size, but necessitates a favorable medium from which they receive their nourishment. Additionally, their fine hair-like roots avoid hard and impervious soils, and as most other garden plants, will not tolerate water-logged conditons.

The principal functions of the root system are anchorage, absorption, and conduction. Absorbed by the roots in solution, elements essential to the life of the plant are transported to the crown where by photosynthesis they are transformed to organic compounds, and further changed by enzymes to products for plant development. It is indispensable to have a stout, vigorous root system for optimum top growth, which in turn assures a healthy and sound root system.

The suggested pH (potential hydrogen ion) range for Rhododendrons is between pH 4 and 5.5 The pH scale is the means of indicating the degree of acidity or alkalinity of soil just as a thermometer measures temperature. Soil pH may be determined by simple litmus paper tests, inexpensive soil kits, or through local county agricultural agents. The pH scale is divided into 14 units, from 0 to 14 with pH 7 indicating neutral. From pH 7 to 0 indicates acidity, and from pH 7 to 14 alkalinity.

The intensity of acidity or alkalinity increases tenfold for each unit; i.e., pH 5 is ten times more acid than pH 6 and pH 4 is ten times more acid than pH 5 and 100 times more acid than pH 6. So although it appears that Rhododendrons have a limited pH range, there actually is a large degree of tolerance. Furthermore, the liberal amounts of organic matter incorporated in Rhododendron soil enable plants to thrive at a higher than recommended pH by the liberation of organic acids in decomposition which hold elements in solution and available to plants at a higher pH, thus acting as a buffer widening the pH range. Also at a pH below that suggested, where certain elements become locked in the soil unavailable as plants nutrients, it has been found that in the immediate absorption zone of Rhododendron roots these elements are available and utilized by the plants. And there are other factors affecting plant health in relation to acidity. What is important is that while an acid soil is a necessity, growing Rhododendrons is not such a science and plants are not so intolerant that an exact pH must be maintained in order for them to thrive. On the contrary, they are not finicky and do favorably respond to a relatively wide range in pH. The accompanying map shows the acid soil regions of the United States where, in order to have suitable Rhododendron soil, adequate drainage and the incorporation of organic matter are all that are required. If a map showing the

natural distribution of Rhododendrons in the United States where superimposed over the acid soil regions the two would be very much the same.

Rhododendrons are no more unduly particular in their soil requirements than in their pH requirements. The soil must be friable and porous containing large quantities (25 to 50%) of organic matter, and while this cannot be overstressed, it is equally true that there are probably no two Rhododendron soils alike. Soil is too complex and its texture too diverse to permit any mathematical stipulations of precisely what portions of ingredients comprise Rhododendron soil.

Organic matter in soil is supplied by plants such as decaying vegetation and old roots, and animals and their residues, which include the microbial population (bacteria, fungi, protozoa, actinomycetes, etc.) and higher forms of soil inhabitants such as grubs, nematodes and earthworms. The organic matter with which we are mainly concerned is that we wish to incorporate into our soil preparatory to planting. The most commonly available forms which we supply are peat moss, decayed leaves, the upper few inches of woods soil, and rotted manures. While all of these may be used together as 25 to 50% of the soil, we shall refer to peat moss, the most extensively used. Sawdust should not be used unless by a specialist.

Spread 3 to 6 inches of peat moss over the area to be planted and mix well to a depth of 12 inches. A machine that flails and thoroughly mixes is preferred to mixing with a shovel or fork, but no means essential. I think it better practice to prepare an area or bed for group plantings but for individual holes the following suggestions are sufficient. No hole should be smaller than 2 feet in diameter with the exception of planting tiny alpines. A hole this size will accommodate a plant up to 15 to 18 inches which has an earth ball approximately 12 inches in diameter. Roughly 25 shovels of earth are removed from a hole the above dimensions. It is important to have the hole as wide at the bottom as at the top. 6 to 12 shovels of soil are put aside and in their place is added that amount of peat moss. This is then well mixed with the soil. For larger plants the hole should be correspondingly larger. For example, a 2 foot plant with a 16 to 18 inch root ball should have a hole about 3 feet wide. Such a hole requires the removal of approximately 60 shovels of soil of which 15 to 30 are removed and replaced with peat moss. Don't skimp in preparing for planting. Fifteen minutes additional labor prior to planting may well assure 15 additional years to the plant.

Although we have found the 12 inch depth satisfactory, some experts suggest an 18 inch depth. Although Rhododendrons are surface rooters and feeders, this additional depth provides a larger reservoir of roots for dry periods in summer. This is of special consequence to plantings beyond the reach of irrigation. In winter the greater depth defers root freezing, thus providing for a longer period, water lost by leaves in transpiration. Whatever the depth or hole size, the peat-soil ratio should be about 25 to 50%.

The composition of average upland soil is about 5% organic matter, 45% mineral, 25% water, and 25% air. The mineral content is decomposed rock in the forms of sand, silt, and clay. The various types of soil depend on the amounts of each. For our purpose it is only necessary that soil be neither too sandy or clayey. A soil of over 65% sand is too light and crumbly, has little body and literally pours, with characteristically little water and nutritive reten-

tive capacity. Soil of over 65% clay compacts too tightly and has no pore space. Such a soil, when pressed in the hand, remains in the pressed position when released and acts as a mold for fingerprints. To the former soil must be added liberal quantities of top-soil and organic matter to make a medium of about 1/3 sand, 1/3 soil, 1/3 organic matter; and to the latter, liberal amounts of sand and organic matter in the same proportions.

The air space (pore space) in the soil, in addition to being formed by organic matter, is a result of the sand, silt, clay complex; and a soil of about 30% coarse sand, 30% fine sand, 20% silt and 20% clay is a well balanced soil minerally, and is called a loam. (These percentages on soil are not intended to confuse, but are given as general knowledge. Neither is it required to know the type of loam before planting Rhododendrons. It is only important that it be neither too sandy or clayey as stated above).

To better visualize the pore space in the soil, magnify the particles and picture the coarse sand as cinder blocks, the fine sand and silt as building bricks and baseballs, and the fine clay as small beads. Imagine a mixture of this and it is easily seen how the pore space maintains itself. Add sticks and logs for organic matter and we can form a picture of what our soil resembles — in magnified form. For Rhododendron roots to survive or thrive, oxygen is needed in liberal quantities. It is mainly absorbed directly from the soil air through the root hairs and epidermal cells, as well as through the soil water.

The soil water is the water retained by the soil against the pull of gravity. When water is applied to an area, the soil water is that which remains after natural drainage. The largest percentage is held by the clay particles (colloides) and organic matter, as a thin film. It remains even in dry soil, and is there even though we compress a handful of soil and nothing drips out. This is better conceived when we realize the clay particles which hold the majority of water are as tiny as a millionth of an inch and are completely surrounded by a film of water. It is through this film that absorption of nutrients in solution takes place.

While it is true that some Rhododendrons can be planted in either full sun or dense shade, neither of these conditions is desirable and with few exceptions are to be avoided. Rhododendrons reign supreme in a location of alternating shade and sun, their flowers in particular, changing mood to dancing shadows, and under such a setting we view Rhododendrons at their best.

Rhododendrons should be so situated that there is some break in the sun between 11 a.m. and 3 p.m., either from overhead shading or from planting against a building or high shrubbery. This is of singular significance with the later blooming types where temperatures at mid-day reach into the high 80's. Under such temperatures, the majority of Rhododendron flowers wilt if exposed to full sun. Those blooming earlier in spring where the temperature range is in the 60's and 70's have a wider latitude of planting sites, —and yet, even these benefit esthetically from dappled shade.

Although a fine old hybrid is occasionally seen flourishing in full sun, it is the exception rather than the rule, and under such a situation bloom often quickly fades or is scorched. Besides these hybrids are almost without exception old ironclads, with such a predominance of Rh. *catawbiense* influence making this possible. But many of our newer hybrids of excellence are either not Rh. *catawbiense* hybrids, or if they are they do not possess this dominating Rh.

catawbiense influence and will do poorly if planted in full sun. The initial symptom of despair from such planting is the yellowing of foilage which continues if the situation remains uncorrected. This progresses with the destruction of the chlorophyll, the surrendering of leaf area, eventual browning of foliage, and decline of the plant.

There are exceptions to this and it is generally conceded that the smaller leaved hybrids, excluding tiny alpines, will thrive in full sun. Examples of these are 'Windbeam', 'Conewago', 'Wyanokie', 'Pioneer'. The deciduous and evergreen azaleas too will do well in full sun, but these too benfit measurably from partial shade. Summing up, Rhododendrons are woodland plants, and although there are those that will grow in full sun, none prefer this to semi-shade.

High shade of huge pines or tall oaks is ideal for Rhododendrons, but not a requirement. The shade of any tree except maple and elm will do equally well provided it is not too dense. Where Rhododendrons are to be arranged under trees, the limbs should be pruned at least 15 feet above the ground. On large trees with expansive thick canopies, additional thinning may be necessary, and on smaller trees of perhaps 20 feet, certainly the limbs would not be removed 15 feet from the ground. Judgment and discretion must be used. As a rule do not overtrim. Limbs cannot be restored once removed. There is no formula for sun-shade balance and none is requisite. The amount of shade is determined by the hybrids or species under consideration and the geographical location. Rhododendrons are tolerant of a wide variety of exposures and situations with no loss of beauty and determining and/or providing the exact light intensity would be purely for academic reasons.

Care must be exercised not to plant Rhododendrons too deeply. They should be set the same depth they were previously growing. This is easily determined by the numerous fine roots hugging the surface. In transplanting, the ball should be so situated to assure the same relative position in the new location. It is wiser to set the plant slightly high than low. The replaced soil around the ball should never be pounded, but pressed firmly by hand. With general nursery stock there is the practice, when transplanting, of planting an inch or two deeper. So widespread is this habit that its influence has carried over, in many cases, to Rhododendrons,—much to the chagrin of the planter.

For some reason, if the surface roots are destroyed, the functioning of the remaining roots is impaired. When planted too deeply, the struggle upward to the surface begins within a reasonably short time. But also, within a reasonably short time, begin the symptoms of flagging health. If the root system can regain a surface position, the plant adjusts itself, if not, it slowly dies.

After planting, Rhododendrons must be mulched. They are never seen in their natural state without a mulch, and in cultivation those not mulched do not do justice to the name they bear. A mulch serves many functions. It keeps the soil moist and cool, prevents the very surface from drying, assuring the health of the surface roots. It prevents the soil from becoming desiccated from drying surface winds. In cold climates, the soil under mulch freezes long after unmulched soil, providing a more consistent and readily available supply of moisture to leaves. Much of our winter injury is not the result of low temperature alone, but of desiccation due to an inability of the roots to replenish that transpired by the leaves. A mulch prevents the growth of weeds, eliminat-

ing the need to disturb the very surface, and eliminates surface competition from weeds for moisture and nutrients. In decomposition to humus, nutrients are liberated which, through the action of soil animals and water, are brought into the soil to be ultimately utilized by the plant. Decomposing mulch is a source of organic acids. Additionally, a mulch prevents soil caking or crusting due to the force of rain or irrigation, and in city and urban areas the soots and foreign particles of the atmosphere are intercepted by the mulch before reaching and sealing the soil surface.

The thickness a mulch is to be applied depends on the material used. Pine or other evergreen needles are spread from 2 to 3 inches. Oak or other leaves 6 to 8 inches unless shredded and then only 2 to 3 inches. Other material such as spent hop, peanut hulls, ground corn cobs, tobacco stems, buckwheat hulls, wood chips,chopped bark, and many others should be spread 1 to 3 inches. Each season the mulch is replenished as decomposition reduces its depth. On many plants which form symetrical domes with branches arching to the ground, the fallen Rhododendron leaves supply all mulch needed, and artificial mulching of these is required only until the plant reaches size enough to supply itself. In woodland settings leaves often swirl around a plant and pile up to over a foot in depth. The consensus seems to be that these should be removed or thinned lest they smother the roots. This is not true.

Peat moss is a soil amender, not a mulch. Its extensive use as a mulch does not support its ineffectiveness. It is easily acquired, easily applied, is neat in appearance, —but it is not a mulch. Spread over the surface of Rhododendrons, the roots soon work their way through the peat to the surface, destroying its function as a mulch. Once having reached the surface, these roots are vulnerable to heat and drying, and a spurious root system has been formed in a medium virtually devoid of nutrients.

Neither can we endorse sawdust as a mulch. There are sawdusts that make effective mulching material if their use and nature are understood, but for every Rhododendron that grows luxuriantly under sawdust, there are dozens that reflect the imprudence of its use. The problem with sawdust arises in initial stages of decomposition by the nitrogen fixing bacteria, their greater attraction to the sawdust,and consequent withdrawal from their normal function in the soil. The dilemma is further irritated by the use of sawdusts in various stages of decay, and of sawdusts from different species of trees. Supplemental feeding is suggested as the panacea but this is ineffective, and if applied late in the growing season may have far reaching results that are all but pleasant.

The indiscriminate use of fertilizes has, in my opinion, been responsible for the death of more Rhododendrons than any other single cause. Where fertilizer has been substituted for proper cultural practices, the obvious treatment for a plant of unthrifty appearance has been "a shot of fertilizer." Fertilizer has become the great restoratve and in instances where this is true, little or no reflection has been wasted on the plant's requirements or the balance of nature. Rhododendrons once established have no need for fertilizer and small or immature plants if set in a soil properly prepared will thrive without it. The gross misconception regarding the feeding of plants is that they must receive food in the manner animals do. This of course is wide of the mark, for plants differ from animals in that they manufacture their own food, and by far the large bulk of any green plant (80-99% — Rhododendrons 95% and over) is

comprised of cellulose, a carbohydrate. Carbohydrates are comprised solely of carbon, hydrogen, and oxygen, derived from the soil water and air. A molecule of water consists of 2 atoms of hydrogen and 1 atom of oxygen. A molecule of carbon dioxide consists of 1 atom of carbon and 2 atoms of oxygen. There are no minerals involved in this the greatest part of all green plants. To further illustrate, a willow tree was placed in a tub of soil. Both tree and soil were first weighed independently. At a later date the tree was removed from the tub and all soil teased from its roots. The tree was again weighed and found to have gained tens of pounds while the soil in the tub was only a few ounces lighter. If we can appreciate the fact that plants require minerals only in small amounts which are adequately supplied by an average soil, the sense of urgency surrounding fertilizing will diminish. Also to be considered is life in the soil. Underfoot in a garden is a soil teeming with microbial life in dynamic equilibrium, —plants and animals of sub-microscopic size so irrefragably momentous that without them plants would die. They are responsible, among many functions relative to plants' existence, for the converting of humus to available nutrients for plants, and the liberation of carbon dioxide. They also act upon chemical fertilizers making them useable by plants. Plant roots (millions of root hairs) in their decay supply energy for the microbial population, and plant roots also secret soluble acids which are favorable for microbial growth. Conservative counts estimate that in an ounce of soil there are over 75 billion (an unimaginable number) of these inhabitants working in symbiotic association with the plant. This is a balance of nature evolved over millions of years, and it must be respected.

There are situations where fertilizing is justified and essential. Often in community development the topsoil and subsoil are removed in grading. In backfilling around a foundation, subsoil often replaces topsoil. Old farmland of depleted and neglected soil is used for housing development. Whatever the situation, use fertilizers with respect and use only those fertilizers prepared for broad-leaved evergreens, or acid soil plants. In experiments at our nursery, we found the use of half the recommended dosage satisfactory.

A fertilizer containing ammonium sulphate as the inorganic source of nitrogen should be used. Almost all commercial fertilizers are complete with the trace elements and many incorporate chelated iron. Some companies make a fertilizer partially organic to supply nourishment over a longer period during the growing season.

The major obstacle in growing Rhododendrons in alkaline soil is adjusting the acidity to a suitable range. The selecting of a site, mulching, adjusting soil texture, and planting are virtually no different. In sections of the country of long summers and extreme heat, increased periods of shade should be provided, up to the complete exclusion of direct sunlight. I saw plants growing happily in Kansas under artificial shade that admitted only 25% light throughout the day. But here again no inflexible sun-shade requirements can be ascribed, for plants with smaller leaves will adjust to greater light, and conversely the larger the leaves the more shade required.

In alkaline areas it is advisable to prepare a bed area rather than prepare individual holes, and the bed area should be elevated above ground level at least a foot, higher if practical. If the bed is not elevated, it will continually be invaded by alkaline water from the surrounding ground.

In alkaline areas of the Midwest and South, I believe a soil of at least 50% to 75% organic matter advisable. This would assist in maintaining the desired acidity organically and would provide additional moisture. A high organic percentage (75%) is not advisable in areas such as northern Illinois, Iowa, the Dakotas, Wisconsin, etc., for growing plants in soil predominantly organic, plant hardiness is sacrificed and the continued supply of nitrogen liberated in decomposition stimulates spurious growth activity, which in cold climates where early frosts are a likelihood, is disasterous.

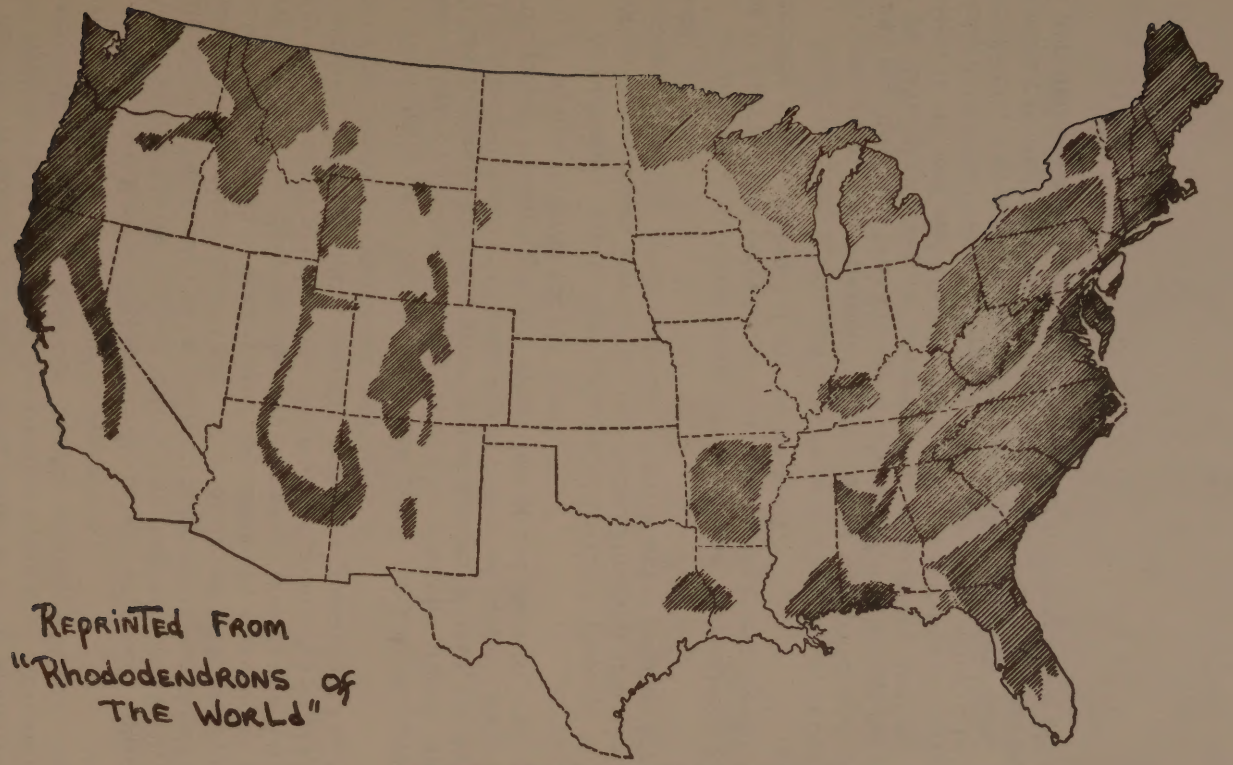
Sulphur and Ferrous sulphate are the most widely used acidifiers. Rhododendrons have a narrow range of tolerance to aluminum ions so aluminum sulphate is not recommended as an acidifier. Sulphur oxidizes slowly at first but as soil acidity increases so does the rate of oxidization. Ferrous sulphate reacts in a short time and in only a day after application the reults can be determined. Ferrous sulphate is applied at the rate of about 9 pounds per 100 square feet for every unit of pH to be lowered. For example, from pH 8 to pH 7, 9 pounds are required. This is broadcast over the surface and watered in. To lower the pH from 8 to 5, about 27 pounds are needed.

Here again exact figures cannot be given, for soils of varying textures react differently. Generally heavy (clay) soils require slightly more Ferrous sulphate to change the pH a given unit or number of units, and light (sandy) soil requires less. Sulphur (usually sold as flowers of sulphur) should be applied at the rate of 4 pounds per 100 square feet of bed space to lower the pH one unit, 12 pounds to lower the pH 3 units.

As previously stated, many commercial fertilizers prepared for acid plants now contain chelated iron as an ingredient. However, iron chelate may be purchased separately. Small doses are effective and it must be applied as specified.

In alkaline areas where water too is alkaline, the tendency for acidity to rise is constant and periodic (at least bi-annually) tests should be made to determine what corrections if any are necessary.

Above a certain acidity, either in the soil or cell sap, iron becomes a metallic precipitate and unavailable to plants. At this point iron chlorosis develops and the plant's health or life is in jeopardy. Iron, though not a constituent of the chlorophyll molecule, is essential to its existence. Iron must always be present in the leaf, and in an available form. Because iron chelate remains in a soluble state even though sap acidity rises beyond safe limits, it is an important contribution toward growing acid-loving plants in alkaline areas. It is not an expedient or substitute for adequate soil, but it greatly reduces the possibility of iron chlorosis and allows a wider degree of tolerance in soil pH.



ACID SOIL REGIONS OF THE UNITED STATES

The soil is preponderantly acid in the regions shown in gray but it may be neutral in scattered local districts, too small to show at this scale, and tests at individual garden sites are usually desirable. Compare this map showing where the soil is naturally acid enough for Rhododendrons with the map on page 20 which shows their distribution in nature. Acid soil map prepared from data supplied by Dr Edgar T. Wherry, University of Pennsylvania.

NOTES